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Research Article

Exploring EFL teachers' beliefs about technology integration: Applying the PBT model in Chinese higher education

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ABSTRACT

Despite extensive promotion of digital technology as a driver of educational reform, its effective integration depends on teachers' pedagogical beliefs. However, the beliefs influencing English as a foreign language (EFL) teachers' utilization of technology, and the factors underlying them, have not been sufficiently examined, particularly in the Chinese context, where national policies strongly promote the adoption of technology. This qualitative case study, guided by the Pedagogical Beliefs-Technology (PBT) model, examined teachers of College English from four Chinese universities via in-depth interviews. The findings reveal that EFL teachers displayed both teacher-centered beliefs, which perceive technology as a supplemental tool helping alleviate workload and enhance classroom engagement, and student-centered beliefs, which employ it to enrich and update the curriculum, indicating the multidimensionality of pedagogical beliefs. Moreover, individual, institutional, and policy factors further influence these beliefs. This study reveals the interaction between teachers' beliefs and teaching contexts, further supporting and extending the applicability of the PBT model in exploring technology integration and teacher beliefs. It provides empirical evidence for future research and supplies practical insights for technology integration in EFL higher education.

Keywords: technology integration, teacher beliefs, EFL context, PBT model

INTRODUCTION

The widespread adoption of digital technologies in English education has significantly transformed language teaching methodologies and enhanced the effectiveness of learning and instructional practice (Zhang & Zou, 2022). Digital tools are profoundly transforming traditional, teacher-centered language teaching models, stimulating learners and educators alike to cultivate more creative and critical ways of thinking (Zhang, 2023). These digital tools create authentic language-learning spaces that effectively stimulate language output and classroom interaction, thereby leading to diverse and meaningful language use (Wang, 2024). Research indicates that learners studying English on gaming platforms, social media, other digital platforms, and in blended learning environments have drastically different learning outcomes (Calafato & Clausen, 2024; Moradi, 2025; Rød & Calafato, 2023). Moreover, digitalized instruction fosters greater interactivity in teaching and learning, as learners, teachers, environments, and media can engage and collaborate even across physical distances (Solodka et al., 2021). Particularly within the field of English language teaching, the technologies employed can provide learners with timelier and more personalized. This prompt and bespoke feedback significantly enhances engagement throughout the learning process, ultimately leading to improved teaching outcomes and an enjoyable, optimized learning experience (Huang & Teo, 2021; Huang et al., 2019; Marchlik et al., 2021; Qaddumi et al., 2023). However, these benefits are not

universally realized, as the successful integration of technology into teaching practice often hinges upon multiple factors, including teachers' beliefs, institutional support, and contextual factors (Almerich et al., 2024; Olszewski & Crompton, 2020).

Previous studies have consistently emphasized that teachers' beliefs play a pivotal role in the integration of technology in English educational contexts (Cheng et al., 2022; Ertmer et al., 2012; Gao & Cui, 2024; Hol & Aydın, 2020; Tondeur et al., 2017; Waluyo & Apridayani, 2021). According to research by Ottenbreit-Leftwich et al. (2010), teachers' beliefs can typically predict how and to what extent technology is integrated into teaching practice. Ertmer (2005) specifically notes that teachers' pedagogical beliefs, whether they lean toward teacher-centered or student-centered approaches, significantly influence how they employ technology in the classroom. Empirical research indicates that teachers holding teacher-centered beliefs prefer lower-level uses of technology for knowledge transmission. Conversely, those embracing student-centered beliefs are more apt to adopt higher-level, constructivist-oriented technological means that facilitate students' active learning and collaboration (Abedi, 2024; Bice & Tang, 2022; Bui, 2022; Ertmer et al., 2012; Hermans et al., 2008; Huang et al., 2019; Lestarina et al., 2022; Tondeur et al., 2017).

To account for variations in the level of technology integration among teachers in classroom instruction, it is necessary to examine their fundamental beliefs regarding the role and value of technology in teaching. These beliefs determine whether, why, and how teachers incorporate digital technology into instruction. Previous research has demonstrated a relationship between teachers' pedagogical beliefs and their integration of digital technology in teaching (Cheung, 2021; Ding et al., 2019; Ertmer et al., 2012), suggesting that teachers' beliefs play a central role in explaining patterns of technology integration. At the same time, teachers' beliefs are not set in stone but evolve in response to individual experiences, institutional support, and diverse contexts (Xie et al., 2023). Despite these prior findings, empirical studies that examine the specific content of these beliefs and the factors shaping them remain limited. Addressing this gap not only advances understanding of teachers' technological beliefs and the factors influencing them but also offers insight into how technology integration can be meaningfully enacted across diverse educational settings.

Against this backdrop, this study draws on the Pedagogical Beliefs-Technology (PBT) model as a guiding framework to examine EFL teachers' beliefs about technology use and the factors shaping them. The model positions technology integration as closely interrelated with teachers' pedagogical beliefs and embedded within multiple layers of individual characteristics, institutional conditions, and the broader context. It provides an analytical framework for examining how teachers' beliefs are shaped by these interconnected factors and how such beliefs relate to patterns of technology use in practice. Within this conceptual framing, the Chinese higher education context, where digital reform is strongly driven by national policy, offers a significant setting for examining these dynamics.

Context of the Study

The utilization of digital technology has been given considerable support and attention in the development and reform of China's education system. The Chinese government has released an array of policies to support and encourage the development of digital education. For example, the educational industry standards for the Digital Literacy of Teachers (DLT) were issued by the Ministry of Education to enhance teachers' beliefs in using digital technology and to reform teaching models (Ministry of Education of the People's Republic of China [MOE], 2022).

In English language teaching, College English is positioned as a required general-education subject for all non-English-major undergraduates in China. Although the MOE's (2020) Guidelines on College English Teaching (GCET) highlight the need for effective technology integration, they do not provide specific guidance on the methods and extent to which teachers should enact this directive (Wang, 2024). As a result, experienced EFL teachers often lean on their previous instructional practices and methods to integrate digital technologies, meaning that policy alone neither ensures the adoption of digital tools nor decisively shapes teachers' beliefs about technology integration in College English (Huang & Teo, 2021). Recent research indicates that Chinese tertiary EFL teachers demonstrate reluctance or limited engagement with technology (Li et al., 2019; Liang, 2021; Huang & Teo, 2021; Wang, 2024).

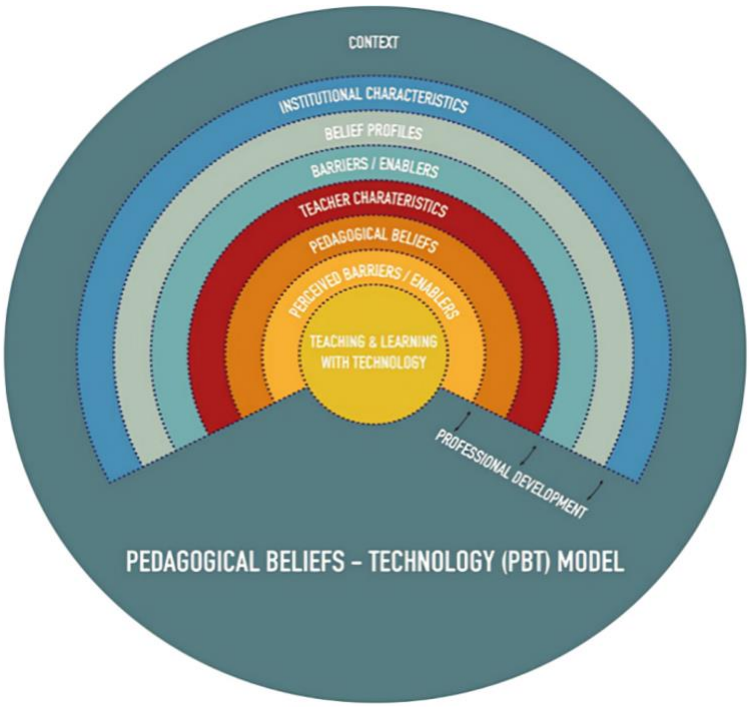

Figure 1. The PBT model (Tondeur, 2020)

This qualitative study sought to explore Chinese EFL teachers' beliefs about technology use in College English instruction and the factors influencing these beliefs. Considering that teachers' beliefs are paramount to technology integration, analyzing these beliefs within the PBT model framework provides broad insight into how contextual conditions shape them. This study contributes to understanding Chinese tertiary EFL teachers' perspectives on technology integration, while providing educators, policymakers, and stakeholders in digital English teaching practice with substantial evidence and operational insights.

LITERATURE REVIEW

PBT Model

The PBT model proposed by Tondeur (2020) presents multiple bidirectional relationships between teachers' pedagogical beliefs, technology use, individual characteristics, institutional characteristics, and contextual factors. At the heart of the model lies the assumption that teachers' technology use is influenced by their underlying pedagogical beliefs, which are "typically categorized into teacher-centered or learner-centered" (Tondeur, 2020). To visualize these multiple bidirectional relationships, Tondeur (2020) employs a series of concentric circles that radiate outward from the core of classroom practice to demonstrate how teachers' pedagogical beliefs influence technology utilization in the educational setting and how multiple factors shape these beliefs. At the core circle, technology use is directly influenced by teachers' pedagogical beliefs and perceptions of barriers and enablers. The outer layers cover broader factors, such as teachers' individual characteristics, institutional characteristics, and the broader context in which teaching occurs. The PBT model presents a more complete overview of technology integration and its influencing factors. The PBT model conveys a more thorough understanding of technology integration (**Figure 1**). It integrates multiple dimensions—teachers' technology use, pedagogical beliefs, and contextual influences—into a coherent analytical framework.

Although this study does not examine the interrelationship between teachers' beliefs and technology use, the model's descriptions of pedagogical beliefs and multi-level influencing factors closely align with the research objectives, which provide a systematic analytical framework for this research. As pointed out by Sackstein et al. (2023), the PBT model provides a valuable perspective on how teachers integrate digital technology into instruction by classifying and conceptualizing the various factors and interactions that affect teachers' technology integration.

Teachers' Beliefs About Technology

Teachers' beliefs are identified as determining facets of their thoughts, decisions, and judgments (Pajares, 1992). As indicated by Levin (2014), "Teachers also hold beliefs about their subject matter (content), how to teach (pedagogy)" (p. 48). These beliefs affect teachers' teaching practices differently, as they must consider strategies and resources that support practical teaching (Pajares, 1992). Research on integrating technology has revealed teachers' beliefs as an important factor influencing technology use (Ertmer et al., 2012; Mertala, 2019; Ottenbreit-Leftwich et al., 2010; Prestridge, 2012; Tondeur et al., 2017). Several studies have identified that teachers with different beliefs exhibit variations in their integration of technology into instruction (Bereczki & Kárpáti, 2021; Cheng et al., 2022; Ertmer & Ottenbreit-Leftwich, 2010; Mertala, 2019). In traditional classrooms, technology is often seen as a supporting or supplementary tool, and teachers may use it to deliver lectures or assign repetitive exercises to strengthen previously acquired skills or conceptions (Bice & Tang, 2022; Ding et al., 2019; Li et al., 2019). While in student-centered classrooms, technology is considered an essential tool that supports students in engaging with collaborative, real, and cognitively engaging tasks, thereby promoting learning (Bui, 2022; Ertmer et al., 2012; Tondeur et al., 2017).

Teachers' Pedagogical Beliefs

Pedagogical beliefs refer to teachers' perspectives on the nature of effective teaching and learning (Ertmer, 2005; Tondeur et al., 2017). Teachers' pedagogical beliefs are viewed as both enablers and obstacles to integrating technology (Tondeur, 2020). Teachers who hold teacher-centered beliefs act as authorities, monitor the teaching process, and exert authority within a well-structured instructional setting. On the other hand, teachers who have student-centered beliefs prefer students' interests and needs while advocating for social constructivist teaching approaches (Tondeur, 2020). Teo et al. (2008) reported that constructivist-oriented beliefs were positively associated with both constructivist and traditional uses of educational technology, while traditional-oriented beliefs were negatively associated with constructivist instructional activities. However, due to various constraints, including limited competence and time pressures, discrepancies may arise between teachers' pedagogical beliefs and their instructional practices (Ertmer, 2005).

Some research has reported teachers' beliefs about technology integration, consistently highlighting that technology is perceived as an instrument for pedagogical reform and enhanced instructional efficiency (Downes et al., 2001; Twining, 2008). Ertmer et al. (2012) helped conceptualize teachers' beliefs more concretely. The research indicates that technology is often seen as a means to supplement the curriculum—used to deliver content, present information, and reinforce skill development. Moreover, technology can enrich instruction by promoting student engagement and active learning. Building upon earlier studies, Abedi et al. (2024) further examined categories of teachers' pedagogical beliefs regarding technology utilization, finding that digital tools are perceived as a productivity tool for preparing lessons, a means to enhance students' ICT skills, a way to fulfil curriculum requirements, and an instrument for fostering authentic student engagement.

In addition, the pedagogical beliefs of EFL teachers about technology integration have been widely explored. For instance, Huang et al.'s (2022) research within the TPACK framework found that Chinese EFL teachers are still influenced by traditional teaching beliefs, with some viewing online vocabulary instruction as a potential distraction for students. Gao and Cui (2024) further revealed that EFL teachers who hold constructivist beliefs are more inclined to view students as active participants in knowledge construction and tend to use technology to enhance teacher-student interaction. Moreover, an expanding quantity of evidence indicates that most EFL teachers hold positive views about integrating technology (Lestarina et al., 2022; Waluyo & Apridayani, 2021; Wang, 2024). The results discussed above emphasize that teachers' beliefs play a decisive role in the integration of technology and also highlight that effective adoption of technology in English language teaching requires a shift in teachers' beliefs. It is suggested that focusing on how teachers perceive and internalize the use of technology is not merely a supplementary aspect of teaching reform, but rather the central driver of pedagogical innovation. Consequently, continued inquiry into teachers' belief systems is imperative for developing more targeted and contextually adaptive strategies for technology integration.

Factors Influencing Teachers' Beliefs in Using Digital Technology

Previous research has demonstrated that teachers' beliefs about technology use are affected by multiple factors, which can generally be categorized into three interrelated dimensions: the individual, the institutional, and the policy levels (Abel et al., 2022; Chen et al., 2021). At the individual level, age and teaching experience have been reported as key factors affecting how teachers perceive and use digital technology (Eickelmann & Vennemann, 2017). For instance, Huang et al. (2019) conducted semi-structured interviews with 14 Chinese tertiary EFL teachers from six provinces to explore their attitudes and the factors influencing their technology acceptance. The findings suggest that differences in teachers' reliance on and attitudes toward technology are mainly attributable to age and professional experience. Similarly, Qaddumi et al. (2023) employed a quantitative approach to investigate the beliefs of 780 EFL teachers. It is shown that there is a statistically significant difference in the indicator of integrating ICT into language teaching, driven by the variable of professional experience. The results also identified that younger teachers hold more positive beliefs about the application of ICT in English language teaching. More recently, Almerich et al. (2024) further state that individuals' educational backgrounds and the extent to which they engage with digital technology both in regular instruction and outside the classroom exert a profound impact on constructing beliefs about integrating technology into teaching.

Effect factors at the institutional level are equally significant. Despite teachers being frequently encouraged to adopt digital innovations, their willingness to use technology is largely influenced by institutional conditions. For instance, research reports reveal that technological infrastructure, resource accessibility, institutional technical support, collegial support, and time for instructional planning potentially either enable or restrict teachers' engagement with technology in their teaching practices (Chen et al., 2021; Liu, 2011; Nagy & Dringó-Horváth, 2024). Besides, Bice and Tang's (2022) research further supports Tondeur et al.'s (2017) findings that teachers' beliefs concerning technology integration are deeply influenced by the cultural factors of their schools. On a similar note, Abel et al. (2022) also found that institutional culture directly influences teachers' attitudes toward the types and frequency of technology use in the classroom.

At the policy level, national education policies have a critical impact on shaping teachers' beliefs about integrating technology. Based on the results of a systematic study conducted by Abel et al. (2022), different national policies have different requirements on how teachers use technology in the classroom, thus leading to different beliefs about integrating technology. The research from Lin et al. (2014) confirmed that teachers are more willing to use technology when provided with sufficient digital teaching resources and policy support. It is further illustrated by Huang and Teo (2021) that differing policy environments yield significant variations in the outcomes of educational technology implementation. In a word, a supportive policy framework is crucial for promoting the effective and sustained integration of technology.

In addition, some researchers have adopted the TPACK and TAM models as theoretical frameworks to explore teachers' beliefs and influencing factors; these studies also indicate that teachers' perceptions of technology's usefulness, ease of use, and self-efficacy significantly influence their willingness to integrate technology into teaching (Huang et al., 2022; Wangdi et al., 2023). However, empirical studies adopting the PBT framework remain limited. Therefore, this study aims to address this gap by offering new insights into EFL teachers' pedagogical beliefs and the factors that influence them. The specific research questions are as follows:

1. What are the EFL teachers' beliefs about technology integration in College English teaching?
2. What factors influence the EFL teachers' beliefs about technology integration in College English teaching?

METHODOLOGY

Research Design

This study utilized a qualitative case study methodology to explore EFL teachers' beliefs and the factors influencing teachers' beliefs about technology use. This design was selected for its effectiveness in obtaining comprehensive insights into individuals' perspectives. The objective of this study corresponds with the basic

Table 1. Demographic information of participating teachers (N = 8)

Participant	Age	Gender	Years in ELT	Education background
T1	51	Female	28	BA
T2	47	Female	19	PhD
T3	41	Female	15	MA
T4	32	Female	5	PhD
T5	43	Female	16	MA
T6	38	Female	8	PhD
T7	44	Male	16	MA
T8	35	Female	7	MA

objective of case investigation design, which involves "investigating a contemporary phenomenon (the 'case') in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident" (Yin, 2018, p. 14). Each participant of this study serves as a single case that the researcher aimed to examine and comprehend in the College English teaching context of a Chinese higher education institution. The designation of the research "object" as the "case" is based on the definitions provided by Stake (2006) and Merriam and Tisdell (2015), both of whom stated that the object of study could serve as the case for investigation.

Setting

This study was conducted in four universities in Guangdong Province, within the Guangdong–Hong Kong–Macao Greater Bay Area, a region at the forefront of digital innovation. These universities have made considerable progress in building digital infrastructure, including the use of digital teaching platforms such as Chaoxing and DingTalk to administer and further develop digital resources, as well as to conduct online assessments. These digital resources establish a foundation for integrating digital tools into routine instruction. However, the incorporation of technology into university College English classes has not yielded consistent teaching outcomes. EFL teachers continue to encounter obstacles, including inadequate technical assistance, variable resource availability, and inconsistent institutional support. The simultaneous enhancement of infrastructure and limited utilization creates a significant context for examining teacher perspectives on technology use and factors that impact them.

Participants

In qualitative inquiry, the quality and interpretive value of findings depend more on the depth and informational richness of selected cases than on numerical sample size (Patton, 2015). Guided by this principle, this study employed purposive sampling to recruit participants who could provide in-depth insights into the phenomenon under investigation. Participants were selected based on the following criteria:

(a) they were integrators who could apply digital tools and improve teaching practices, or experts who adeptly and strategically used diverse technologies to innovate and enhance teaching practices (Redecker & Punie, 2017);

(b) they had more than three years of experience teaching College English courses, and

(c) they were able to communicate effectively and provide the researcher with meaningful data.

To ensure variation within the sample, a maximum variation sampling strategy was adopted (Creswell, 2013). Eight EFL teachers engaged in College English instruction from four universities in Guangdong Province were invited to participate in the study. The universities included two local institutions from two different cities, reflecting different tiers within China's higher education system. This variation in institutional context, age, and teaching experience enabled a nuanced exploration of EFL teachers' beliefs about technology use and the contextual factors that shape them. Verbal permission and written informed consent were obtained from all participants prior to data collection. To ensure anonymity and confidentiality, all names used in this study are pseudonyms. Participants' demographic profiles are presented in **Table 1**.

Data Collection

This study employed a semi-structured interview method to obtain perspectives on individuals' thoughts, knowledge, preferences, values, and personal views (Tuckman & Harper, 2012). This semi-structured interview

elicits participants' thinking and in-depth debate on teachers' beliefs about technology use and the factors that influence them, enabling the researcher to gather substantial information. Therefore, it serves as the primary instrument for collecting data. The interviews were performed in Chinese to ensure effective interaction, with the interviewer adjusting question order or wording as needed to maintain a conversational flow and using follow-up questions to encourage detailed responses. Each interview was conducted individually via the Tencent Meeting and lasted approximately 40-90 minutes.

The interview protocol (see **Appendix A**) was developed in line with the research objectives. The interview questions were generated based on relevant literature linked to the research issues. The interview contains the following components:

(1) views on digital technology use,

(2) benefits and challenges of digital technology use,

(3) driving factors and barriers, and

(4) institutional support and individual factors.

In the case study, Yin (2018) argues for a pilot test to improve data collection processes and construct pertinent questions. Therefore, a pilot further study refined the interview questions and process (Creswell, 2013). Moreover, the interview protocol was iteratively refined during data collection, with participants' responses guiding subsequent interviews.

Data collection continued until thematic saturation was reached. Saturation in qualitative research is understood as the point at which additional data no longer generate new conceptual insights or themes (Guest et al., 2006). In the later interviews, participants' responses largely reinforced previously identified themes. As no substantially new themes emerged, the data were considered to have reached sufficient depth and thematic coverage.

Data Analysis

The interview data were transcribed, and thematic analysis was conducted using NVivo 12. The thematic analysis focuses on recognizing and analyzing the themes that repeatedly emerge from the textual data (Braun & Clarke, 2006). It helps the researcher extract central themes from the data to address the study's inquiries. The theme analysis of the study followed Braun and Clarke's (2006) six-step methodology:

(1) familiarizing with the data,

(2) generating initial codes,

(3) searching for themes,

(4) reviewing themes,

(5) defining and naming themes,

(6) producing the report.

In thematic analysis, themes were generated inductively from the data or guided by existing theory (Braun & Clarke, 2006). This study employs a theory-informed approach, a recognized analytic strategy that facilitates systematic interpretation via a guiding framework while maintaining faithfulness to participants' perspectives. Accordingly, after transcription, initial codes were inductively generated and iteratively refined. Coding decisions and theme development were systematically documented to enhance transparency and dependability. The refined codes were further categorized and analyzed according to the PBT model, which provided a systematic framework for classifying themes based on teacher belief types and three context categories of influencing factors: individual, institutional, and policy. To ensure the credibility of the identified themes, participants were invited to review the findings and confirm that the themes accurately reflected their perspectives (Merriam & Tisdell, 2015). The findings of the theme analysis in this study are presented in **Tables 2** and **3**.

Research Trustworthiness

The design and analysis of the study were guided by considerations of credibility, dependability, confirmability, and transferability (Lincoln & Guba, 1985). Credibility was enhanced through member checking

Table 2. Teachers' beliefs about digital technology use

Theme	Category	Codes
Teacher-centered beliefs	A supplementary but essential teaching tool	Productive aid; reducing workload; delivering the course content
	Enhancing student engagement	Avoiding students' silence; interactive platforms; diversified interaction mode
Student-centered beliefs	Enriching course content	Upgrading and broadening content; supporting knowledge integration

Table 3. Factors influencing teachers' beliefs about digital technology use

Theme	Category	Codes
Individual factors	Professional development, experiences, instructional needs	Developing subject knowledge; conducting teaching reform
Institutional factors	School culture, technological support	Collaborative lesson planning; technical issues (websites not loading, unstable access); disruption of lesson flow
Policy factors	National education policies	National policy documents; unified objectives, content, and schedule; consistency ensured by standardized curriculum

to ensure that participants' perspectives were accurately represented. The first author's reflexive examination and peer debriefing between the authors strengthened confirmability by ensuring that interpretations remained closely grounded in the data. Dependability was supported through systematic documentation of analytic procedures, with coding guided by the theoretical framework and refined iteratively. Detailed contextual description enables readers to assess the relevance of the findings to comparable settings.

Reflectivity

The first author is an EFL teacher who teaches College English and works in the same educational context in which the study was conducted. As an experienced practitioner in digital instruction, the first author's insider position required reflexive awareness of how professional perspectives might shape interview design and interpretation (Berger, 2015). Throughout the study, interpretations were examined against participants' accounts to ensure that themes reflected their perspectives rather than the researcher's assumptions. To enhance analytic transparency and confirmability (Lincoln & Guba, 1985), the second author independently reviewed transcripts and coding decisions, strengthening methodological rigor.

RESULTS

This section reports on the findings addressing the two research questions. The empirical findings predominantly reflected teachers' perceptions and practices of using digital technology in College English classes. Therefore, the results are presented in terms of EFL teachers' beliefs about technology use and the key factors that influence them.

Teachers' Beliefs About Digital Technology Use

Digital technology as an essential supplement

All interviewed teachers believed that digital technology is an important supplemental tool in College English instruction. They consistently reported that digital tools make class preparation easier, faster, and more efficient. Moreover, participants agreed that technology functions as a productive aid that helps reduce teachers' workload, particularly in terms of delivering the course content. As they noted:

> In the past, I had to read the text repeatedly to prepare for teaching intensive reading and provide students with a summary of the important themes. Now, by inputting the content into AI tools such as Doubao or DeepSeek and providing some prompts, they can help me quickly generate summaries and outlines, greatly improving the efficiency of preparation (T5).

> Digital technology has given me a new perspective on designing unit introductions. I have combined my own ideas to optimize them, making the class introductions more vivid and engaging. The classroom would not be so attractive to students without the help of digital technology (T4).

Digital technology is essential in College English instruction and learning. In instructional practice, teachers used technology to present visual content and videos, making language instruction more authentic and creating a realistic language environment for students. For students, some online platforms and artificial intelligence (AI) applications offer additional learning resources, allowing them to practice English speaking and listening with simulated digital people. T8 reported that, with the development of AI, technology has gone beyond teaching methods and become an important part of the curriculum, profoundly affecting teaching content and teacher-student interaction. She explained that, at present, students can effectively use technical resources, such as Doubao or Kekenet English software, to improve their English skills.

Enhancing student engagement

Teachers widely reported that digital technology significantly enhances student engagement in the classroom. Several participants mentioned that interactive teaching platforms, such as random selection tools or online quizzes, help avoid student silence and distraction in class by encouraging all students to participate actively. For example, assigning specific tasks or embedding real-time discussions and formative assessments on the teaching platform can significantly improve students' enthusiasm and participation. Moreover, T6 explained that digital tools enable more inclusive engagement, particularly among students who are shy and more comfortable responding through text-based platforms:

> Given that College English courses are typically delivered in large class settings with limited instructional time, it is challenging to ensure active participation from all students. To address this, I often use the Chaoxing platform to post in-class quizzes and assign point-based incentives as part of formative assessment, thereby encouraging students to respond in English. Although this approach reduces face-to-face language interaction, it effectively alleviates social anxiety and enhances both the breadth and depth of classroom engagement (T6).

T1 noted that integrating quizzes, discussion tasks, and pre-assigned group work on the Chaoxing platform motivated students to prepare in advance and take ownership of their learning. She noted that incorporating small assignments and awarding participation points on the online teaching platform effectively encouraged student involvement, increased students' attention, and sustained engagement.

More broadly, technology was perceived as a valuable tool for cultivating a dynamic, student-centered learning environment by diversifying interaction modalities and enhancing students' sense of responsibility.

Enriching course content

Most interviewees from different universities expressed the view that digital technology is essential for enriching and expanding course content, representing one of the most widely shared beliefs among Teachers of College English in this study. Therefore, teachers frequently integrate additional materials aligned with students' test preparation needs and future academic or career development in their classrooms. In this context, digital technology functions as an essential instrument for diversifying and updating course content.

As T3 reported, the listening materials in College English textbooks are composed mainly of exam-oriented content, which often appears tedious and monotonous. This restricted orientation not only limits exposure to genuine language use but also hinders the development of students' practical communicative ability and ongoing engagement with the language. She explained:

> In listening classes, to raise students' interest, I usually download some engaging English videos on various topics from Bilibili or YouTube and present them in class, exposing students to more authentic language input. The convenience of digital technology allows me to enhance classroom content and tailor it to students' needs (T3).

This focus on genuine input and varied resources extends beyond listening instruction. Other EFL teachers also actively seek to expand the curriculum through digital technology. For example, T7 shared that:

> To broaden my logistics students' industry-specific knowledge, I often look for relevant English terms related to logistics and use ChatGPT to generate practice activities. I then share these activities on the Chaoxing platform for their post-class learning. I think digital technology helps

> connect English learning with their professional knowledge, so students can improve both their language skills and their professional competence (T7).

Similarly, T6 from the School of Medicine emphasized the importance of digital technology in keeping the course content aligned with the latest developments in the professional fields:

> Medical knowledge evolves far more rapidly than textbooks can be updated, so I rely on digital technology to access the latest medical developments and incorporate them into my teaching. For example, when discussing the Nobel Prize this year in English, I included recent breakthroughs in vaccine development, which students found highly engaging. I believed that technology facilitates the prompt updating of my instructional material (T6).

The findings suggest that EFL teachers view digital technology as essential for enriching and updating course content. Digital tools, including online resources, AI applications, and learning platforms, enable EFL teachers to integrate authentic and interdisciplinary knowledge beyond exam-focused materials.

Factors Influencing Teachers' Beliefs About Using Digital Technology

Building on the PBT model, this section analyses interview data about the factors that impact EFL teachers' beliefs about the utilization of digital technology. These elements appear at three levels: individual, institutional, and policy, and they influence how instructors perceive and engage with technology in pedagogical settings.

Individual factors

At the individual level, the findings suggest that EFL teachers' beliefs about adopting digital technology are mostly influenced by their professional development experiences and their perceived instructional needs for technology. For example, several participants reported that their willingness to use digital technology emerged from its role as a key tool for accessing information, which helped them further develop their subject knowledge and meet the changing needs of teaching. As T4 put it:

> Students today have access to a wide range of information resources. As teachers, we are under pressure to keep up, especially if we want to excel in our profession. Sometimes students know more than we do, so we use online resources to expand our knowledge. We can improve the efficiency of our classes by learning more online about the subject matter we cover (T4).

The findings suggested the requirement for continuing professional development pushes teachers to employ technology as a support tool. Moreover, T8 expressed a similar view. She described a career-oriented motivation for incorporating digital technology, arguing that rapid advances in AI have made technology use an essential component of research and teaching reform initiatives. She incorporated digital tools into her English classes to balance the demands of teaching and research. This approach enabled her to generate research output and support her academic advancement. As she explained:

> When I engage in research or pedagogical reform initiatives concerning educational technology, I must utilize digital tools in my English classes. This action supports project completion and research output generation, while also advancing my career promotion. That is one of the explanations why I am willing to use digital technology (T8).

Institutional factors

The findings indicate that institutional factors, comprising school culture and technological support, significantly influence teachers' perceptions of the utilization of digital technology. School culture emerges as an effective means of facilitating technology integration. Administrative mandates issued by the school also influence teachers' beliefs about their use of digital technologies. Some institutions adopt a proactive stance in promoting digital technology, as these two participants described:

> Our school enforced digital adoption early. The school of foreign languages was among the first to develop online courses on the Chaoxing platform. When COVID-19 emerged, we just moved everything online without stress, finding it more convenient to conduct classes virtually rather than in person (T6).

> We conduct collaborative lesson planning for every unit of College English. During these sessions, each teacher presents their instructional design, supplementary listening and reading materials, and relevant videos. Others may ask, 'Where did you find this video?' or 'How does your design work in practice?' These conference activities have enhanced my comprehension and application of technology (T2).

On the other hand, insufficient technical support frequently impacts teachers' use of digital technology. For instance, teachers are enthusiastic and well-prepared to use digital materials, but the actual constraints of classroom environments can sometimes restrict the success of these efforts. One participant shared her initial enthusiasm and subsequent frustration when technical issues disrupted her lesson delivery:

> I designed teaching activities with technologies well at home, but in class, it just did not work. The websites would not load on students' phones, and the experience was not as smooth as I expected. It disrupted the flow of my lesson. After two or three failed attempts, I gave up on some of those digital applications (T1).

Such mismatches between careful planning and on-the-ground execution can result in teacher discouragement and reluctance to continue using specific digital methods. The findings emphasize the significance of both institutional support and dependable infrastructure in maintaining teachers' engagement with digital tools. The results suggest that a supportive and well-structured institutional environment, characterized by early adoption, infrastructure investment, and digital readiness, can shape teachers' beliefs.

Context policy factors

In this study, all participants believed that national education policies significantly impact teachers' perceptions of integrating digital technologies. Although participants expressed varying degrees of familiarity with high-level policy documents, such as the GCET, they noted that their teaching is guided by institutional curriculum frameworks and talent development objectives, which are, in turn, based on national policy documents. National policies' standardization either facilitates or constrains teachers' innovative use of digital technologies to some extent. As T1 explained, "the teaching objectives, contents, and progress are unified across the school, which certainly limits the scope of using educational technologies. We can only apply them within the framework set by basic teaching requirements." Although the standardized curriculum ensures instructional consistency, it restricts teachers' flexibility in integrating digital technology within policy guidelines.

T6 also echoed this perspective, noting that her department has maintained a consistent practice of regularly studying national policies related to College English teaching. She admitted, "I would not call myself an expert," she emphasized that "our teaching and research office regularly organizes study sessions to explore new policy documents." Ongoing interactions with national policy enhance instructors' understanding of policy updates and influence their developing beliefs regarding technology utilization in accordance with current state mandates. Ultimately, national policy is a key contextual force shaping teachers' beliefs about digital technology by structuring both the institutional environment and the underlying pedagogical mindset.

DISCUSSION

These findings reveal that Chinese EFL teachers' beliefs about integrating digital technology in College English classrooms consist of both teacher-centered and student-centered beliefs, aligning with the classification of teachers' pedagogical beliefs described in the PBT framework. On the one hand, Chinese EFL teachers perceive technology as an essential supplemental tool, primarily aimed towards increasing the convenience and efficiency of class preparation and facilitating content transmission. Meanwhile, we found that participants generally held the view that conducting instructional activities utilizing digital technologies

that integrate online and offline modes could significantly enhance classroom engagement. These perspectives are more consistent with teacher-centered, instrumental pedagogical beliefs. On the other hand, EFL teachers view digital technology as a vital tool for enriching and updating course content. They frequently employ digital resources to extend and diversify instructional materials in response to students' learning needs, reflecting pedagogical beliefs grounded in student-centered beliefs.

The multidimensional and dynamic nature of these belief patterns aligns with the core proposition of the PBT model. As Tondeur (2020, p. 2) contends, "the integration of technology within classroom educational processes has the potential to change teachers' beliefs towards more student-centered, constructivist beliefs". The PBT model highlights a bidirectional interaction between teachers' pedagogical beliefs and their use of technology. Teachers' pre-existing beliefs influence their selection and utilization of technology, while the actual experiences and outcomes of technology use subsequently shape and reshape those beliefs (Tondeur, 2020).

Firstly, EFL teachers perceive technology as an essential tool for supporting instruction. This finding aligns closely with earlier studies (e.g., Ertmer, 1999; Prestridge, 2012), which indicate that teacher-centered pedagogical beliefs often lead educators to view technology primarily as a means to supplement and deliver instructional content, rather than as a catalyst for redesigning the learning environment. While more recent research (e.g., Abedi, 2024; Bice & Tang, 2022; Bui, 2022) has found similar results, indicating that many teachers have a teacher-centered belief and regard technology primarily as an instrument for supporting instruction. In these instances, technology is frequently utilized in fundamental ways to enhance current curricular practices, encompassing lesson preparation, content delivery, and assisting pupils in acquiring technology skills.

Furthermore, in this study, teachers predominantly demonstrated a positive disposition towards integrating digital technologies into English language instruction. They viewed digital technologies as essential in lesson preparation and, most importantly, as enhancing student engagement in instruction, therefore promoting more effective English instruction and granting students access to authentic language input. This finding has been extensively confirmed in previous studies (e.g., Lestarina et al., 2022; Liang, 2021). Nevertheless, a note of caution is that increased classroom engagement, such as heightened attention and participation, does not necessarily signify changes in instructional objectives or processes. The findings of this study resonate with Ertmer et al.'s (2012) cautionary note: without shifts in teachers' underlying pedagogical beliefs—second-order barriers—technology integration remains superficial. While it may make classrooms more dynamic and visually appealing, it does not inherently promote higher-order thinking, collaboration, or knowledge construction; thus, perceived engagement gains should not be conflated with a genuine shift toward constructivist or student-centered pedagogy.

This study demonstrates that Chinese EFL teachers integrate technological resources with subject-specific content and teaching objectives in College English teaching. For example, they utilize technology to enhance multimodal instruction and assist students in constructing an authentic English language environment, which demonstrates student-centered pedagogical beliefs. This phenomenon is well illustrated in Ertmer et al.'s (2012) study, which demonstrates that incorporating real-time, discipline-specific information into classroom instruction can not only stimulate students' interest but also foster their capacity for autonomous learning. However, these results differ from those of Abedi et al. (2024), who identified supplementing course content as a balance of constructivist and traditional beliefs, referred to as "mix-balanced." This divergence may be attributed to instructional contexts and disciplinary features.

This research illustrated the factors that influence EFL teachers' beliefs about technology use via the perspectives on the individual, institutional, and policy-level, which offers new evidence for supporting the applicability and explanatory value of the PBT model in understanding the beliefs of EFL teachers' use of technology and the influencing factors in different contexts.

This study identifies EFL teachers' professional development and perceived instructional needs as key individual-level factors affecting EFL teachers' beliefs, consistent with prior research (e.g., Ottenbreit-Leftwich et al., 2010; Tondeur et al., 2017). A distinctive finding of this study is that several participants reported using technology primarily to meet the requirements of ongoing national or institutional reforms in College English digital teaching and research projects. This finding extends the existing understanding of teaching needs by

incorporating those that arise from educational reforms. It aligns with the perspectives of Voogt et al. (2013) and Tondeur et al. (2017), who observed that external agendas can facilitate the adoption of technology in teaching practices. According to the PBT model (Tondeur, 2020), such reform can be viewed as situational filters mediating the alignment between belief and practice. Prior research also highlights the role of technological self-efficacy in shaping teachers' beliefs, as confidence developed through interactive teaching reinforces perceptions of the pedagogical value of digital technology (Bekoe et al., 2025). The findings therefore suggest that EFL teachers' teaching beliefs may be activated or reshaped in response to professional development and teaching demands.

Regarding institutional factors, consistent with the findings of Chen et al. (2021) and Moradi (2025), the results indicate that technical support may adversely affect teachers' beliefs about ICT. Teachers' attitudes and confidence in utilizing ICT diminished as they encountered obstacles to incorporating technology into their classes due to infrastructural breakdowns. Chen (2024) offers a different perspective by emphasizing the role of sustained institutional support and specialized training in enhancing technology-mediated instruction. These conditions may also influence EFL teachers' perceptions of technology use in teaching. Moreover, school culture, as an invisible institutional influence, determines the degree of teachers' technical innovation. As Zhao and Frank (2003) argued, teachers' beliefs and behaviors shift in line with the prevailing school culture where they operate. School culture plays a pivotal role in technology-related instructional change by fostering a shared vision that positions technology use as integral to effective pedagogy (Huang & Teo, 2020).

In line with previous studies on the Chinese context (Moradi, 2025; Teo et al., 2018), our results demonstrate that teacher perceptions of technology utilization are significantly influenced by national administrative policies, a trend inherent in China's centralized educational framework and the collective implementation of educational reforms. However, our findings contradict those of Huang and Teo (2021), who found that although EFL teachers recognize the importance of national policies in promoting technology-enhanced instruction, these factors do not significantly influence their intentions to use technology. A plausible explanation is that when teachers are granted autonomy to determine the extent to which such policies shape their professional practices, they tend to adopt technology in alignment with their individual pedagogical needs rather than in direct compliance with policy mandates.

CONCLUSION AND IMPLICATIONS

This study sought to examine EFL teachers' beliefs pertaining to the integration of digital technology in College English and the factors that influence these beliefs. This study indicates that most EFL teachers consider technology an essential supplement that improves the convenience and efficacy of lesson preparation and information dissemination, while also fostering engagement among learners. Moreover, technology's ability to enhance, supplement, and customize course content enables teachers to seamlessly adapt their instructional approaches. This study confirms that teacher beliefs about technology use are fluid and multifaceted, shifting between teacher-centered and student-centered approaches based on specific pedagogical objectives and perceived student requirements. This adaptability challenges a simplified binary perspective on teaching beliefs and highlights the complex decision-making processes teachers engage in daily.

The factors influencing teachers' beliefs about the use of technology consist of multiple levels. At the individual level, the experience of professional growth and the nature of instructional requirements often affect teachers' attitudes towards and ways of using technology. The school's technical support and cultural environment are critical institutional elements. National policy directives typically operate in a top-down manner, but their real impact depends primarily on how institutions and teachers interpret and implement them. This study identifies a three-tier framework—individual, institutional, and policy levels—that influences EFL teachers' beliefs about technology integration. This finding emphasizes that technology integration is a context‐dependent process shaped by the interaction of multi‐level factors that together create both opportunities and constraints for teachers' technology integration.

One key implication of this study is that efforts to improve technology integration in language teaching should begin by reshaping teachers' pedagogical beliefs. Since these beliefs are dynamic and

multidimensional, sustained professional development is needed to help teachers integrate technology within a genuinely student-centered approach while simultaneously strengthening their technological knowledge and skills (Ertmer & Ottenbreit-Leftwich, 2010). To achieve this, professional development designed to boost teachers' cognitive engagement, reflection, and the reconstruction of existing beliefs should be the key focus of reform (Prestridge, 2017). In practical terms, teaching reforms should prioritize integrating disciplinary knowledge into College English courses, with technology-mediated teaching methods connecting instructional content to disciplinary knowledge. Besides, A supportive school culture, built on a shared vision and solid technical support, can equip teachers to put technology policies into effective pedagogical use. Beyond this, administrators in education, particularly those in China, need to take a more proactive role in guiding teachers' beliefs about technology integration that support constructivist teaching techniques.

In conclusion, this study supports and extends the applicability of the PBT framework by examining Chinese tertiary EFL teachers' beliefs and the multiple-level factors that shape them. From the perspective of the PBT framework, the research results deepen theoretical understanding of the dynamic interaction among teachers' beliefs, technology integration, and the factors that influence belief. Nevertheless, it is suggested that longitudinal, mixed-methods research integrating survey data, classroom observations, and qualitative interviews be adopted in future research to track the evolution of teachers' beliefs and the factors that influence them.

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Ethics declaration: The authors confirm that this study followed established ethical guidelines. Participants were informed of the study's purpose and provided written informed consent. All personal data was anonymised and reported using pseudonyms, with any identifying details removed. Data were securely stored and accessible only to the researchers.

AI statement: Generative AI tools were used only for language editing. The study design, data collection, analysis, and manuscript writing were the responsibility of the authors.

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APPENDIX A: INTERVIEW PROTOCOL

1. What role does digital technology play in your teaching?
2. How does digital technology affect your teaching practices?
3. What benefits and challenges have you experienced when using digital technology?
4. What factors influence your decision to use or limit digital technology?
5. How do national or institutional policies and school support influence your use of digital technology?
6. How have your previous learning or training experiences shaped your views on digital technology use?